Taking the Headache Out of Impressions

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As dentists, we do the best we can to take a good impression. Despite that, I never felt confident that my crowns' margins were going to be accurate when it was time for the seating appointment. I know I am not the only dentist to have that concern, which is why I was intrigued by digital impressions, specifically the Cadent iTero digital impression system (Cadent). This article discusses this new technology and presents a case report that describes its use.

THE TECHNOLOGY

iTero enables clinicians to replace conventional impression methods with 3-D, computer-rendered optical scans. From July 2005 to September 2005, I was one of 13 beta testers of iTero, and since then it has totally transformed how I perform dentistry. My patients say they would much rather have a digital scan than a traditional impression; my laboratory loves the models they get from an iTero impression; and for me, it is fun to use. Simply put, this technology has taken the headache out of taking an impression.

I never doubt my laboratory's ability to give me great-fitting restorations, but it all comes from the starting point, and that is an accurate impression.

The biggest benefit of iTero is the consistency of the restorations. The marginal integrity is superb, with minimal adjustment needed to the occlusal and interproximal contacts. This alone has cut my seating time in half, and I have yet to send back a restoration for improper fit, giving me absolute confidence in my delivery appointments.

In addition, iTero has dramatically improved my preparations because when I scan, I get real-time, detailed feedback. For example, when we prepare second molars, often we do not have adequate reduction for the laboratories. I then have to decide if I want the laboratory technician to cut back the opposing tooth, go with a metal occlusal surface, or take another impression. The real-time feedback showing how much reduction I have is eye-opening and eliminates that problem.

The effect the iTero system has on my patients has been very positive. Not having impression materials and trays in their mouths has been a big plus. They report that the digital impression process is easier and more comfortable, and I haven't had any problems with patients with a high gag reflex, tori, or large tongues. In addition, my

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Figure 1. Large failing 3-surface amalgam restoration on tooth No. 19 and a failing 2-surface alloy on tooth No. 20.

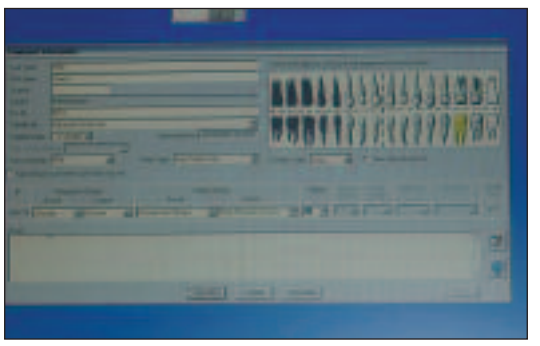

Figure 2. iTero treatment information digital Rx form.

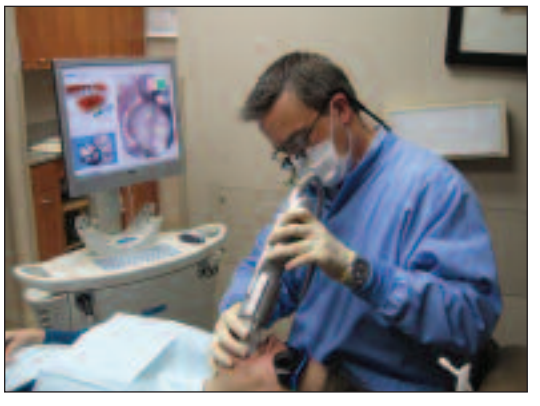

Figure 3. Occlusal scan of preparation.

Figure 4a. The iTero digital impression system.

Figure 4b. Close-up view of the hand-held wand.

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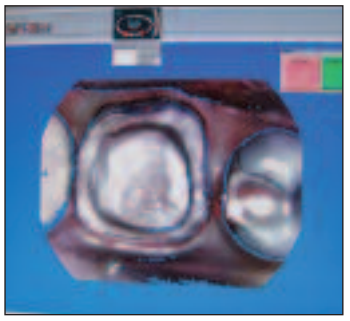

Figure 5. A preview scan of the preparation.

Figure 6. A 3D model of the impression area with opposing dentition articulated.

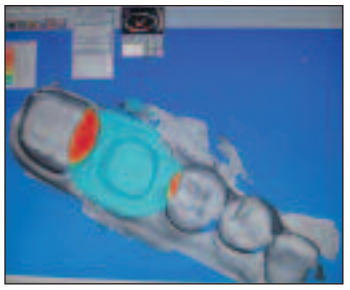

Figure 7. Color map of the preparation.

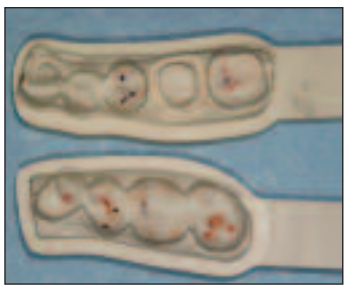

Figure 8. Pre-trimmed models from Cadent.

Figure 9. Final restoration.

patients really like seeing that I have new and current technology in the office, as it gives them confidence in the level of care I provide.

Because patients can see their digital impressions on the computer screen, it helps educate them about dentistry. The thing I hear most often is that they did not realize all the things I had to do for a crown. When I can show patients what is happening in their mouths, they better understand the treatment process. By showing the scan to a patient, he or she takes ownership of the treatment.

The digital impression system piques the patient's curiosity, and that is what I love. If the patients are curious, then this experience adds value to what I am doing, as opposed to the patient coming in and wanting to get out of the chair as fast as possible.

The following case report describes the advantages of this digital impression system and why it has become the most valued tool in my practice. It details the step-by-step procedure for using iTero for a single zirconia crown.

CASE REPORT

A 49-year-old female presented with a large, failing 3-surface amalgam restoration on tooth No. 19, requiring full coverage, and a failing 2-surface alloy on tooth No. 20, requiring replacement with composite (Figure 1). Prior to preparation, case information was entered into the iTero system for laboratory communication via a built-in keyboard (Figure 2). The unique thing about iTero is that it allows the dentist to select any type of restoration he or she chooses, from gold to zirconia, single to multi-unit, as well as a bridge, all without powder-coating the teeth. All information must be entered prior to starting the scanning process. One option I often select is to scan the opposing arch first. This is a nice feature because I will have my assistant scan the opposing arch while we are waiting for anesthesia.

Tooth No. 19 was prepared and isolated using a double-cord technique. Proper isolation must be achieved, as with standard impression techniques, to enable the optics to clearly define the hard and soft tissues. iTero has made me more meticulous about my isolation technique because it is very important to see every aspect of a tooth before a scan. The scanning process begins with voice and image prompts. The first image is taken over the occlusal of the preparation (Figure 3). A built-in air compressor maintains a dry, clear field for image capture via a hand-held wand (Figures 4a and 4b), which has a removable sleeve for single-patient use. Although the wand appears rather large, there have been relatively few problems with access. Since there is no need to coat the teeth, I can place the probe directly on the dentition, which eliminated my initial concerns about potential fatigue.

"When you have the traditional impression material in your mouth, you can't swallow, you might be drooling, and it's 5 or 6 minutes of wait time," the patient said. "With iTero, the doctor is taking photos, and if you need to swallow or close your mouth, you can. It was a lot different for me. It just seemed a lot easier."

A wireless foot pedal is used to communicate with the camera for image capture. After I review and approve the first image (Figure 5), the system guides me through a series of (usually) 21 scans of the prepared arch, opposing arch, and jaw relationship. With each scan, the software captures 100,000 points of reference, and it takes approximately 3 minutes to complete the scanning sequence of both arches. A voice prompt informs me when the scanning process is complete; within 1 minute iTero builds a preview quality, 3-D model of the impression area with opposing dentition articulated. I treat many patients who work for Boeing, where they use 3-D modeling for industrial applications, and they were amazed we were actually using it in their mouths.

The 3-D digital model of the impression can be rotated in any position to analyze the preparation and verify margins (Figure 6). A color map of the preparation allows you to verify proper occlusal and interproximal reduction (Figure 7). By being able to rotate the preparation on the screen, I can look at the margin. The margin should be smooth all around, but sometimes there are undulations not obvious to the naked eye. However, with iTero I can see those undulations on the screen.

If the preparation requires refining or added reduction, then I can make needed changes and re-scan the quadrant. Once I approve the scan, I simply click on the "mail" icon to upload the virtual impression to a Cadent-partnering laboratory via a wireless Internet connection. The laboratory can make any changes or adjustments to the virtual margin line, if needed, and then will send the digital file to Cadent to begin milling the physical model. On average a pre-trimmed model is delivered to the laboratory for fabrication of the final restoration in less than 3 days (Figure 8).

My laboratory appreciates the accuracy of the models they get from Cadent. They have not had to deal with remakes, which makes this a huge cost-saving technology for them. I never doubt my laboratory's ability to give me great-fitting restorations, but it all comes from the starting point, and that is an accurate impression. If the impression is not accurate, then the laboratory cannot be blamed if a restoration does not fit. The iTero digital impression system eliminates most, if not all, impression-related errors.

I received this case within 10 days of scanning and cemented the final zirconia crown (Nakanishi Dental Lab, CDL, Bellevue, Wash) with minimal adjustment time (Figure 9).

CONCLUSION

Making an accurate impression can be a frustrating process for both the dentist and patient. Incorporating digital technology into my practice has virtually eliminated these frustrations. Cadent's iTero digital impression system is revolutionizing the dental profession by allowing the dentist to create predictable, repeatable impressions and therefore create precision-fit restorations. The benefits are simply stated but have had a huge impact on my practice. With this system there is an improved accuracy of fit; patients love it, the laboratories appreciate the durable and accurate Cadent models, and it can be used as a marketing tool to differentiate a practice.

In my practice, I have placed more than 500 restorations using iTero and have had no remakes. My adjustment time has been cut in half, as the occlusion and interproximal contacts require minimal adjustment. More than 95% of my patients prefer the iTero system compared to conventional methods, as it is more comfortable and avoids the need for bad-tasting, goopy impression material. This process has eliminated numerous areas of potential human error or failures with materials and techniques by digitizing directly from the patient's mouth. As a result, amazingly accurate and durable plasticized models are created, without any guesswork and without having to coat the teeth.

Digital impressions have gone beyond being just a fun gadget, and I predict that within the next 5 years they will become a mainstream standard part of treatment. It is no longer a gadget for me—it is my bread and butter. Just as digital systems are replacing film, so will digital impression systems take over from the unpredictable traditional impression process. It's time to consider taking your practice to the next level with digital impression technology. ✦

Dr. Jacobson graduated from Northwestern University Dental School in 1998. He is a mentor with The Pankey Institute in Key Biscayne, Fla, and practices with his wife, Kathryn, in Federal Way, Wash. He can be reached at (253) 839-4111 or bhjdds@msn.com.

Disclosure: Dr. Jacobson is a beta tester for Cadent.